

PATHOLOGIC PHYSIOLOGY, A NEGLECTED  
FIELD.

CHAIRMAN'S ADDRESS BEFORE THE SECTION ON PATH-  
OLOGY AND PHYSIOLOGY, AT THE FIFTY-SIXTH ANNUAL  
SESSION OF THE AMERICAN MEDICAL ASSOCIATION  
PORTLAND, ORE., JULY 11-14, 1905.

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Not many generations ago physiology was taught in connection with anatomy only, and was a simple statement of the functions, as then understood, of the various structures described by the anatomist. It was Haller, who in his "Elements of Physiology,"<sup>1</sup> outlined the field of physiology and clearly established the boundary line between that subject and anatomy. Since Haller's time physiology has been recognized as a separate branch of medicine and soon after the publication of Haller's Elements, provision began to be made by the medical faculties for the teaching of this subject in a separate department.

Begun as an appendage of normal human anatomy, it continued as normal human physiology, gradually broadening into animal and plant physiology. Great as has been the activity in the field of morphology, that in the field of physiology has been scarcely less until the mass of facts and principles of physiology already firmly established is so great that the two years' course in experi-

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1. *Elementa Physiologiæ*, in six volumes, 1757-1765.

mental and didactic instruction in physiology now usually given in medical schools suffices simply to present such fundamental principles and facts of the science as may be applied later in clinical medicine. Furthermore, great as this material is, it includes only the discussion of the functions of the normal individual. In other words, the course of physiology as now given is one in normal physiology only.

If we turn now to the subject of pathology as presented to-day in our medical schools, we find that histopathology—presented usually in the second year—deals almost exclusively with modifications of the structure of the cells and tissues of the body, while the didactic course accompanying the microscopic work deals usually with the field of general pathology covering such topics as hydremia, anemia, hemorrhage, transudation, thrombosis and embolism; atrophy, degeneration, pigmentation and necrosis; hypertrophy, hyperplasia, metaplasia and regeneration; inflammation; parasites, animal and plant; the relation of micro-organisms to disease, infection and immunity; infectious diseases; tumors.

One searches the chapters of general pathology in vain for any sections that deal adequately with the problem of the physiology of disease.

Taking up the field of special pathology as usually presented in the third and fourth years of the medical course, one finds that the postmortem furnishes the material for study. The points of fundamental importance at the postmortem as it is conducted by our leading pathologists are: (1) To confirm, or disaffirm, the diagnosis of the condition as made by the attending physician; (2) to gain information that will make the diagnosis of similar cases more secure in the future; (3) to increase our knowledge of diseased conditions of the

body. With these ends in view it is customary to preface the postmortem examination by the reading of the clinical history of the case in hand, followed by, first, an examination of the body to determine gross conditions, demonstrating all evident changes of the gross conditions as the examination proceeds; second, preserving portions of each diseased tissue or organ for later microscopic examination. Such a postmortem examination requires from one to two hours, not including the many hours that may be later devoted to the study of microscopic changes.

The accumulated material from the numerous postmortems affords museum material for gross study as well as microscopic material for study in connection with various topics in clinical pathology.

I believe that the above account, though brief, gives a fair summary of the work now being accomplished in our pathologic laboratories. I think it is not unfair to other departments of the medical school to say that the work of the pathologic department is the most important work in any one department of the medical course, and the work now given in the larger institutions could hardly be improved on in the time that is devoted to it.

It appears to me, however, that a very important phase of pathology and physiology has as yet received scant attention from medical teachers. The postmortem affords a golden opportunity for the study of the clinical history, particularly of the symptomatology, of the case in the light of the postmortem findings. The symptomatology of disease represents nothing more or less than modified functions as observed in diseased conditions. That there is a definite relation between the symptoms observable in a disease and structural changes that go on in the cells, tissues or organs can not be gainsaid. It may be difficult to establish this relation, but the

pathologists should not be satisfied with their work until every disturbance of function has been traced to some disturbance of structure. The disturbance of structure accompanying malnutrition might be so slight as the simple difference in the zymogen granules of the pancreas, or in some obscure physical or physico-chemical change in the cells of the thyroid gland, while a derangement of the mind might be associated with a slight change in the Nissl granules in the cortical cells of the brain, or in a slight modification in the space relations ("contiguity") of cell-processes in the brain centers.

As stated above, the postmortem affords an opportunity for the study of the relation of disturbed function (symptomatology) to the diseased structure. Such an attempt on the part of the pathologist to enter into the discussion of this problem in connection with the postmortem examination would involve the expenditure of at least twice as much time as is usually now spent on a postmortem examination. In many cases this would entail the necessity of making fewer postmortem examinations than is desirable.

The question might be asked, "Why should not the physiologist cover this field and present to the students normal and pathologic physiology?" We will say in answer to that question: The physiologist presents normal physiology during the first two years of the medical course. The students have not progressed far enough in the study of pathologic conditions to enter understandingly into a consideration of the relation between symptomatology and pathology. Thus we find that important as this field is, neither the physiologist nor the pathologist—one for the lack of preparation of his students, the other for the lack of time—can take up this most important subject. The student therefore enters



on the study of clinical medicine and surgery with a knowledge of normal structure and function, and also a knowledge of diseased structure, but no knowledge of diseased function. The clinician, in his presentation of a clinical case, may or may not discuss the symptomatology of a case from the standpoint of physiology. If an attempt is made at this at all it is more or less incidental to the discussion of diagnosis, of differential diagnosis and therapeutics. The relation of symptomatology to diagnosis on the one hand and to therapeutics on the other, so far overshadows in the mind of the clinician its relation to pathology on the one hand and normal physiology on the other, that very little attention is given to these last two phases of symptomatology.

I believe that the most important step to be taken in scientific medicine is, first, to determine and next to teach every student of medicine the relation between symptomatology and pathology, and this teaching should be a systematic course given to students taking clinical medicine and surgery, and should be divorced from any discussion of diagnosis or therapeutics, so that the undivided attention of both student and instructor would be directed to the solution of problems of the relation of modified function (symptomatology), to modified structure (pathology). It might be given by a pathologist, a physiologist or a clinician. In either case the preparation of the instructor could not be deemed adequate unless he were well versed not only in physiology and pathology, but also in clinical medicine.

One naturally asks at this point whether there exists a literature of this subject. Krehl, professor of internal medicine, University of Strassburg, Germany, has prepared a most admirable work of 600 pages entitled "Pathologic Physiology; A Treatise for Students and

Physicians.”<sup>22</sup> The third edition of this work was published in Leipsic in 1904. The first edition appeared about a decade ago. Earlier editions were not translated into English, and it has had a very limited use in Germany and among advanced men in other lands. An English translation of this admirable work is just now completed by Dr. Hewlett of Johns Hopkins University. Professor Krehl treats this subject from the standpoint of the clinician following the classification of the pathologist, and harmonizing his treatment at every point with the latest findings in physiology.

The question of the classification of the subject-matter is one of no small importance, and is a question to which I have given considerable thought. For the purposes of the physiologist and the pathologist, Krehl's method is advantageous. It is, however, questionable if such a classification would make the work as convenient as a manual for the student and practitioner as would a classification on the basis of diseases, following that of works on internal medicine.

A preliminary chapter or “part” of such a treatise should deal with general pathologic physiology, setting forth the relation between the various disturbances of function and various lesions of disease. For example: Variations of pulse, with causes of same; variations of peripheral circulation, with causes for same; variations of distribution of blood, with causes of same; variations of rate or character of respiration, with causes; variations of digestive processes, with causes of same; and so on briefly throughout the list of body functions.

Following this should be the main body of the treatise in which diseases of the circulatory system might occupy the opening chapter. Taking up any particular

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2. *Pathologische Physiologie*, 3rd Edition, by Dr. Ludolph Krehl. Published by Vogel, Leipzig, 1904.

disease there should be a brief description of a typical case as to etiology, pathology and symptomatology. Under the head of pathologic physiology, each symptom should be discussed as to its causes and its relation to the pathologic findings. Diagnosis and treatment need not be mentioned. The discussion of typical cases of each disease would suffice.

I present a plea for the preparation of such a manual as above outlined and for such a course as above suggested, because I believe these are the most urgent needs of medical pedagogy.



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